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URANIUM ENRICHMENT

Extension of Decontamination and Decommissioning Fund May Be Needed to Cover Projected Cleanup Costs

Statement of Robin M. Nazzaro, Director
Natural Resources and Environment

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Highlights

Highlights of GAO-08-277T, a testimony before the Committee on Energy and Natural Resources, U.S. Senate

URANIUM ENRICHMENT

Extension of Decontamination and Decommissioning Fund May Be Needed to Cover Projected Cleanup Costs

Why GAO Did This Study

Cleaning up the nation's three uranium enrichment plants will cost billions of dollars and could span decades. These plants—located near Oak Ridge, Tenn.; Paducah, Ky.; and Portsmouth, Ohio—are contaminated with radioactive and hazardous materials. In 1992, the Energy Policy Act created the Uranium Enrichment Decontamination and Decommissioning Fund (Fund) to pay for plant cleanup. Fund revenues come from an assessment on domestic utilities and federal government appropriations.

In 2004, GAO reported on the Fund's sufficiency to cover authorized activities. GAO recommended that Congress consider reauthorizing the Fund for 3 more years, to 2010, and require the Department of Energy (DOE) to reassess the Fund's sufficiency before it expired to determine if further extensions were needed. Because decisions not yet made by DOE could affect the cost of cleanup and the Fund's sufficiency, GAO also recommended that DOE develop decontamination and decommissioning plans for the Paducah and Portsmouth plants that would identify the most probable time frames and costs for completing the cleanup work.

This testimony is based on GAO's 2004 report. It summarizes the extent to which the Fund may be sufficient to cover authorized activities and the status of DOE's progress in developing decontamination and decommissioning plans for the Paducah and Portsmouth plants.

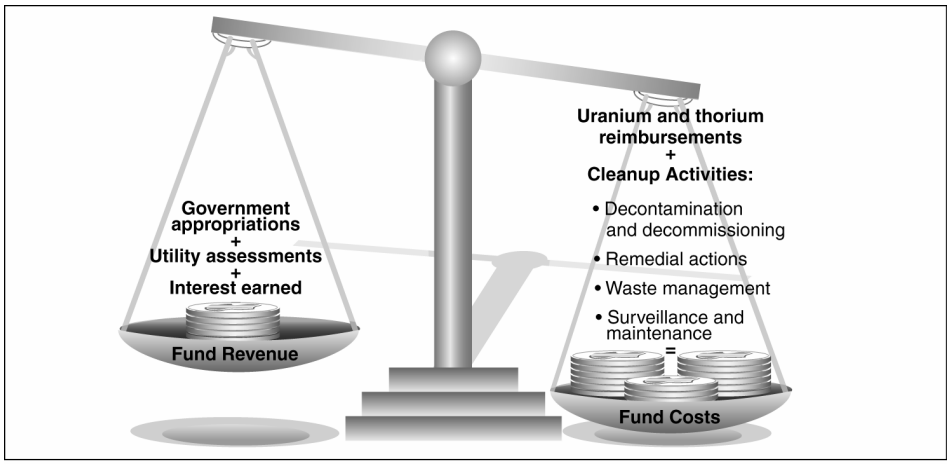
To view the full product, including the scope and methodology, click on GAO-08-277T. For more information, contact Robin M. Nazzaro at (202) 512-3841 or nazzaror@gao.gov.

What GAO Found

GAO's analysis showed that the Fund will be insufficient to cover all authorized activities. Using DOE's estimates for the cleanup costs at the three plants and current and likely revenue projections, GAO developed a number of simulation models that factored in annual cost and revenue projections and uncertainties surrounding inflation rates, costs, revenues, and the timing of the final cleanup work at the Paducah and Portsmouth plants. Specifically, GAO's baseline model demonstrated that by 2044, the most likely date for completing all cleanup activities at the plants, cleanup costs will have exceeded revenues by $3.8 billion to $6.2 billion (in 2007 dollars). Importantly, GAO found that the Fund would be insufficient irrespective of which estimates were used or what time frames were assumed.

DOE has not yet issued plans for the decontamination and decommissioning of the Paducah and Portsmouth plants as GAO recommended. According to DOE officials, the department is developing a report to Congress that will contain updated information for both plants. DOE did not make that information available to GAO, however, and hence GAO was unable to assess how any new schedule or cost estimates may affect the Fund's sufficiency. Until DOE issues plans that provide the most probable time frames and costs for completing decontamination and decommissioning at the Paducah and Portsmouth plants, it is not possible to more precisely determine the total funding needed to cover the authorized cleanup activities.

Cleanup Costs Outweigh Fund Revenues



Source: GAO.

Mr. Chairman and Members of the Committee:

Thank you for the opportunity to discuss our work on the sufficiency of the Uranium Enrichment Decontamination and Decommissioning Fund (Fund) as you consider its reauthorization. As you know, the 1992 Energy Policy Act, as amended,[1] established the Fund and authorized contributions for 15 years (ending in 2007) to be made by federal government appropriations and payments from domestic utility companies. The Fund is the government's principal source of funding for the decontamination and decommissioning of the Department of Energy's (DOE) three uranium enrichment plants, located near Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. These plants, which encompass more than 30 million square feet of floor space, miles of interconnecting pipes, and thousands of acres of land, are contaminated with radioactive and hazardous materials. The cleanup of these plants—the responsibility of DOE's Office of Environmental Management—will cost billions of dollars and could span several decades. Cleanup activities include assessing, treating, and disposing of the contamination found at the plants and the decontamination and decommissioning of inactive facilities. DOE conducts its cleanup activities under the requirements of several federal environmental laws and compliance agreements with relevant regulatory authorities, including the Environmental Protection Agency and state regulatory agencies.

In 2004, we reported on actions DOE had taken to reduce the cleanup costs the Fund is authorized to support and the extent to which the Fund is sufficient to cover authorized activities.[2] Because we found that the Fund would likely be insufficient, we recommended that Congress consider reauthorizing the Fund for an additional 3 years, to 2010, and require DOE to reassess the Fund's sufficiency before the 2007 expiration date to determine if extensions beyond 2010 would be needed. Additionally, to reduce uncertainty regarding the Fund's sufficiency, we recommended that the Secretary of Energy develop decontamination and decommissioning plans for the Paducah and Portsmouth plants that would identify the most probable time frames and costs for completing the cleanup work. My testimony today (1) includes findings from our 2004 report, which examined the extent to which the Fund was sufficient to

[1]All further references to the Energy Policy Act refer to the Energy Policy Act, as amended.

[2]GAO, *Uranium Enrichment: Decontamination and Decommissioning Fund Is Insufficient to Cover Cleanup Costs*, GAO-04-692 (Washington, D.C.: July 2, 2004).

cover authorized activities, and (2) provides an update on DOE's progress in developing decontamination and decommissioning plans at the Paducah and Portsmouth plants.

In preparing our 2004 report, we obtained DOE's estimates for cleanup and other key costs at the three plants, and current and likely revenue projections. We assessed the reliability of these data and determined that they were sufficiently reliable for the purposes of our report. We used the data to develop a number of simulation models, which factored in cost and revenue projections on an annual basis, as well as uncertainties surrounding inflation rates, interest rates, the costs and revenues, and the timing of the final decontamination and decommissioning work at the Paducah and Portsmouth plants. In addition, to prepare for this testimony, we reviewed DOE's status reports developed in response to our 2004 report and interviewed DOE headquarters officials to determine DOE's progress to date in developing decontamination and decommissioning plans at Paducah and Portsmouth. We performed our work in accordance with generally accepted government auditing standards.

In summary,

- The Fund will be insufficient to cover all of its authorized activities. Specifically, our baseline model showed that by 2044, the most likely date for completing all cleanup activities at the plants, cleanup costs will have exceeded revenues by $3.8 billion to $6.2 billion (in 2007 dollars). Irrespective of which model we used, we found that the Fund would be insufficient. Each of the alternative models—(1) accelerated time frames, (2) deferred time frames, and (3) baseline time frames with additional revenues from government contributions as authorized under current law—demonstrated that the cleanup costs would exceed revenues. We recommended that Congress consider reauthorizing the Fund for an additional 3 years, to 2010, and require DOE to reassess the Fund's sufficiency before the expiration date to determine if extensions beyond 2010 would be needed.

- DOE has not yet issued plans for the decontamination and decommissioning of the Paducah and Portsmouth plants as GAO recommended. According to DOE officials, the department is now in the process of finalizing a report that contains new schedule and cost information for both plants and addresses the sufficiency of the Fund. However, DOE did not make that information available to GAO and therefore, we were unable to assess how any new schedule or cost estimates may affect the Fund's sufficiency. Until DOE issues plans that provide the most probable time frames and costs for completing

decontamination and decommissioning at the Paducah and Portsmouth plants, it is not possible to more precisely determine the total funding needed to cover the authorized cleanup activities.

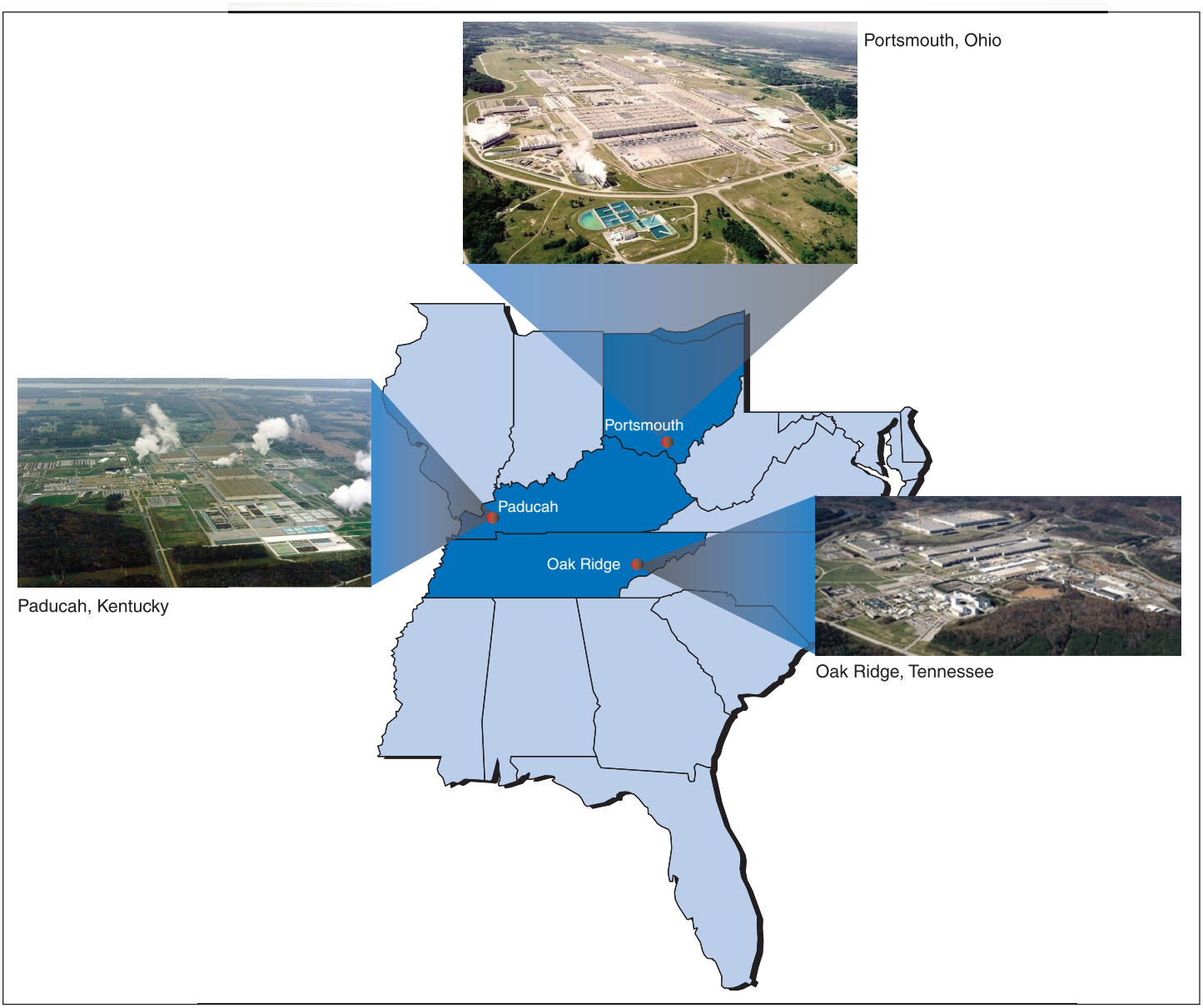
Background

The federal government has enriched uranium for use by commercial nuclear power plants and for defense-related purposes for more than 40 years at three plants, located near Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio (see fig. 1). The Oak Ridge plant, known as East Tennessee Technology Park, is located on 1,500 acres of land; the oldest of the three plants, it has not produced enriched uranium since 1985. The Paducah plant, located on about 3,500 acres, continues to enrich uranium for commercial nuclear power plants under a lease to a private company, the United States Enrichment Corporation (USEC). The Portsmouth plant, a 3,700-acre site, ceased enriching uranium in May 2001 because of reductions in the commercial market for enriched uranium. Later that year, the plant was placed on cold standby (an inactive status that maintains the plant in a usable condition), so that production at the facility could be restarted in the event of a significant disruption in the nation's supply of enriched uranium. USEC was awarded the contract to maintain the plant in cold standby, a condition that continues today.[3] Yet because of newer, more efficient enrichment technologies and the globalization of the uranium enrichment market, all three uranium enrichment plants have become largely obsolete. Therefore, DOE now faces the task of decontaminating, decommissioning, and undertaking other remedial actions[4] at these large and complex plants, which are contaminated with hazardous industrial, chemical, nuclear, and radiological materials.

[3]USEC was also responsible for uranium enrichment before operations ceased and it has begun construction on a new centrifuge uranium enrichment plant at this site.

[4]Remedial actions refer to environmental cleanup activities directed at eliminating or reducing contaminant sources and contaminated soil and groundwater.

Figure 1: Location of the Three Uranium Enrichment Plants



Source: DOE.

In 1991, at the request of the House Subcommittee on Energy and Power, GAO analyzed the adequacy of a $500 million annual deposit into a fund to pay for the cost of cleanup at DOE's three uranium enrichment plants.[5] We reported that a $500 million deposit indexed to inflation would likely be adequate, assuming that deposits would be made annually into the fund as long as cleanup costs were expected to be incurred, which, at the time of our study, was until 2040. Additionally, in a related report, we concluded that the decommissioning costs at the plants should be paid by the beneficiaries of the services provided by DOE—in this case, DOE's commercial and governmental customers.[6]

In 1992, the Congress passed the Energy Policy Act, which established the Uranium Enrichment Decontamination and Decommissioning Fund to pay for the costs of decontaminating and decommissioning the nation's three uranium enrichment plants. The Energy Policy Act also authorized the Fund to pay remedial action costs associated with the plants' operation, to the extent that funds were available, and to reimburse uranium and thorium licensees for the portion of their cleanup costs associated with the sale of these materials to the federal government. The act authorized the collection of revenues for 15 years, ending in 2007, to pay for the authorized cleanup costs. Revenues to the Fund are derived from (1) an assessment, of up to $150 million annually, on domestic utilities that used the enriched uranium produced by DOE's plants for nuclear power generation[7] and (2) federal government appropriations amounting to the difference between the authorized funding under the Energy Policy Act and the assessment on utilities.[8] Congress specified that any unused balances in the Fund were to be invested in Treasury securities and any interest earned made available to pay for activities covered under the Fund.

[5]GAO, *Uranium Enrichment: Analysis of Decontamination and Decommissioning Scenarios*, GAO/RCED-92-77BR (Washington, D.C.: Nov. 15, 1991).

[6] GAO, *Comments on Proposed Legislation to Restructure DOE's Uranium Enrichment Program*, GAO/T-RCED-92-14 (Washington, D.C.: Oct. 29, 1991).

[7]This assessment is based on a given utility's share of the total enriched uranium purchased from DOE, including enriched uranium purchased for defense purposes.

[8]The following revenue amounts are authorized: $480 million for fiscal years 1992–1998; $488.3 million for fiscal years 1999–2001; and $518.2 million for fiscal years 2002–2007. Both domestic utility assessments and government appropriations are to be adjusted annually for increases in the consumer price index.

DOE's Office of Environmental Management is responsible for managing the Fund and plant cleanup activities, which, through fiscal year 2003, were mostly carried out by DOE contractor Bechtel Jacobs. The department's Oak Ridge Operations Office in Oak Ridge, Tennessee, had historically provided day-to-day Fund management and oversight of cleanup activities at all three plants. In October 2003, however, DOE established a new office in Lexington, Kentucky, to directly manage the cleanup activities at the Paducah and Portsmouth plants. The Oak Ridge Operations Office continues to manage the Fund and the cleanup activities at the Oak Ridge plant.

Currently, the Fund is used to pay for the following activities:

- *Reimbursements to uranium and thorium licensees*. The Energy Policy Act provides that the Fund be used to reimburse licensees of active uranium and thorium processing sites for the portion of their decontamination and decommissioning activities, reclamation efforts, and other cleanup costs attributable to the uranium and thorium they sold to the federal government.[9] From fiscal year 1994, when the Fund began incurring costs, through fiscal year 2003, $447 million was used from the Fund for uranium and thorium reimbursements (in 2004 dollars).

- *Cleanup activities at the uranium enrichment plants*.[10] Cleanup activities at the plants include remedial actions, such as assessing and treating groundwater or soil contamination; waste management activities, such as disposing of contaminated materials; the surveillance and maintenance of the plants, such as providing security and making general repairs to keep the plants in a safe condition; the decontamination and decommissioning of inactive facilities by either cleaning them up so they can be reused or demolishing them; and other activities, such as covering litigation costs at the three plants and supporting site-specific advisory boards. From fiscal year 1994 through fiscal year 2003, a total of $2.7 billion from the Fund was used for these cleanup activities (in 2004 dollars).

[9]The Energy Policy Act authorizes reimbursements to uranium licensees not to exceed $350 million and reimbursements to the thorium licensee not to exceed $365 million for the portion of their cleanup costs associated with the sale of these materials to the federal government. The remaining unused authorized amounts are adjusted annually based upon the consumer price index.

[10]Cleanup activities are conducted under the requirements of the Resource Conservation and Recovery Act of 1976, as amended (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA); and compliance agreements with regulatory authorities, which include the Environmental Protection Agency and state regulatory agencies in Kentucky, Ohio, and Tennessee.

At Projected Costs and Revenues, the Fund Will Be Insufficient to Complete Cleanup at the Three Plants

Under a variety of models using DOE's projected costs and revenues, the Fund will be insufficient to cover all of its authorized activities. Using DOE's projections that 2044 would be the most likely date for completion of cleanup at the plants, we estimated that cleanup costs would exceed Fund revenues by $3.8 billion to $6.2 billion (in 2007 dollars).[11] Because DOE had not determined when decontamination and decommissioning work would begin at the Paducah and Portsmouth plants, and because federal contributions to the Fund have been less than the authorized amount, we developed several alternative models to assess the effects of different assumptions on the Fund's sufficiency. Specifically, we developed the following models:

- *Baseline model*. This model was developed in consultation with DOE and its contractor officials about what the most likely cleanup time frames would be and used cost estimates assuming that cleanup at all plants would be completed by 2044.

- *Accelerated model*. Because DOE had not determined when the final decontamination and decommissioning would begin at its Paducah and Portsmouth plants, we developed the accelerated model under the assumption that cleanup work could be completed faster than under the baseline model, given unconstrained funding. DOE and its contractor officials provided additional cost estimates, where Paducah's final work would begin in 2010 and be completed by 2024 and Portsmouth's final decontamination and decommissioning work would begin in 2007 and be completed by 2024.

- *Deferred model*. This model was developed under the assumption that, given current funding constraints, it may not be realistic for two major decontamination and decommissioning projects to be done concurrently. Thus, deferred time frames were determined by DOE, assuming that all work would be completed at the Portsmouth plant first and then initiated at the Paducah plant. For the deferred model, Portsmouth's final decontamination and decommissioning work was estimated to be completed from 2010 to 2037 and Paducah's from 2038 to 2052.

- *Revenue-added model*. This model was developed to assess the effect of the government's meeting its total authorized annual contributions on the balance of the Fund, which by the start of fiscal year 2004, was

[11]In our 2004 report, we reported the projected costs in 2004 dollars. For this testimony, we converted the figures to 2007 dollars.

$707 million less than authorized under the Energy Policy Act. For the revenue-added model, we used baseline time frames but assumed that government contributions to the Fund would continue annually at the 2004 authorized level until all government contributions as authorized by law had been met, which would occur in fiscal year 2009.

- *Revenue-added-plus-interest model*. For this model, we built on the revenue-added model to include the effect of forgone interest that the Fund could have earned had the government contributed the full authorized amount. We assumed that these additional payments would be made to the Fund in the same amounts as the 2004 annual authorized amount and extended payments through fiscal year 2010.

Irrespective of which model we used, we found that the Fund would be insufficient to cover the projected cleanup costs at the uranium enrichment plants (see table 1). At best, assuming no additional funding is provided beyond the 2007 authorized amount, Fund costs could outweigh revenues by $3.8 billion (in 2007 dollars). Even with current authorized amounts extended out through fiscal year 2010, the Fund could still be insufficient by close to $0.46 billion (in 2007 dollars).

Table 1: Fund Balance at Completion of All Cleanup under Different Model Scenarios

Dollars in billions

	Baseline model	Accelerated model	Deferred model	Revenue-added model	Revenue-added-plus-interest model
Completion date (fiscal year)	2044	2024	2052	2044	2044
Constant 2007 dollars	–$6.2 to –$3.8 (–$5.3)	–$5.7 to –$4.4 (–$5.0)	–$6.8 to –$4.4 (–$5.7)	–$5.2 to –$2.0 (–$3.9)	–$4.6 to –$0.46 (–$3.0)
Current dollars	–$18.5 to –$7.6 (–$12.5)	–$9.8 to –$5.7 (–$7.6)	–$26.4 to –$8.8 (–$16.7)	–$15.1 to –$4.3 (–$9.3)	–$13.3 to –$1.0 (–$7.1)
Present-value 2007 dollars[a]	–$3.4 to –$0.84 (–$1.9)	–$4.2 to –$2.0 (–$3.0)	–$3.4 to –$0.69 (–$1.6)	–$2.8 to –$0.42 (–$1.4)	–$2.5 to –$0.098 (–$1.1)

Source: GAO analysis of DOE data.

Note: Fund balances given as range, with mean in parentheses.

[a]Because of the difference in completion dates, a comparison of the Fund balances in constant 2007 dollars would not be meaningful. To make comparison of the various models possible, we estimated the present value of the Fund's balance in 2007 dollars. Because present-value analysis reflects the time value of money—that costs are worth more if they are incurred sooner and worth less if they occur in the future—the present value under the deferral model declines more than in the other options. In reality, however, the net effect would depend on many other factors. If, for example, deferral would add substantially to such costs as safeguarding and security or costs associated with increased health risks, then the reduction due to adjusting for the time value of money could be more than offset by increases in other costs.

Although our analysis was able to capture several uncertainties potentially affecting the Fund—including interest rates, inflation rates, cost and revenue variances, and the timing of decontamination and decommissioning—additional uncertainties exist that we could not capture. These uncertainties included possible changes to the scope of the cleanup; whether the Fund would be required to pay for additional activities, such as long-term water monitoring once the plants were closed; and the extent of potential future litigation costs that the Fund would have to support. For example, a risk analysis completed by DOE in 2004 for the Paducah plant indicated that changes in the scope of cleanup could increase cleanup costs by more than $3 billion and extend the time frame for cleanup to more than 30 years past the original scheduled date of 2019.[12] In addition, when they developed their cleanup cost estimates, DOE officials assumed that the costs of long-term stewardship activities—such as groundwater monitoring, which may continue after all necessary cleanup costs have been completed—would be covered by a separate funding source. DOE officials acknowledged, however, that if another funding source were not available, they may be required to use resources from the Fund.

Uncertainty Over the Extent of the Fund's Insufficiency Remains Because DOE Has Yet to Issue Plans for the Paducah and Portsmouth Plants

Uncertainty over the extent of the Fund's insufficiency remains because DOE has not issued plans that identify the most probable time frames and costs for the decontamination and decommissioning of the Paducah and Portsmouth plants. DOE was required to develop a report to Congress containing such information, but because DOE was significantly revising its cost estimates, it determined the report would not be accurate and did not finalize it.[13] According to DOE officials, it is now in the process of finalizing a report that contains new schedule and cost information for both plants and addresses the sufficiency of the Fund.[14] This report was due to Congress in October 2007 but has yet to be issued by DOE. Because the report has not been finalized, DOE officials were unwilling to provide us with updated information on current schedule and cost estimates. As a

[12]This end date does not include final decontamination and decommissioning of the plant but only the major remedial actions planned at the site.

[13]According to the Energy Policy Act, the Secretary of DOE shall provide a report to Congress at least once every 3 years on progress made under title XI of the act.

[14]According to the Energy Policy Act, the fifth report to Congress was to contain recommendations by the Secretary for the reauthorization of the program and Fund under title XI.

result, we are unable to assess how any new information may affect the Fund's sufficiency. Until DOE resolves uncertainties surrounding the plants' cleanup, including when cleanup activities are expected to both begin and end, it is not possible to more precisely determine the total funding needed to cover the authorized cleanup activities. If, however, closure and cleanup time frames extend past the originally projected schedules at the plants, then the total costs the Fund is authorized to support may increase, particularly costs for maintenance, safety, and security activities and other fixed costs that must be maintained until cleanup work at the plants is complete.

In closing, we believe that an extension to the Fund may be necessary to cover cleanup costs at the nation's three uranium enrichment plants. The information currently available on the projected costs and revenues authorized by the Fund suggests that it may be insufficient by up to several billion dollars. DOE appears to be taking steps to develop new, detailed time frames and cost estimates for the decontamination and decommissioning of its uranium enrichment plants. However, until this detailed information is made available, we cannot assess how DOE's updated time frames and cost estimates may affect the Fund's sufficiency. As a result, we believe that DOE should finalize plans for the Paducah and Portsmouth plants so that it can better determine the extent to which Fund extensions may be needed. Unless the Fund is extended beyond its current expiration in 2007, cleanup activities that could not be paid for from the Fund because of a shortfall may have to be financed entirely by the federal government and could add an additional fiscal burden at a time when our government is facing already significant long-term fiscal challenges.

Mr. Chairman, this completes my prepared statement. I would be happy to respond to any questions you or other Members of the Committee may have at this time.

Contact and Acknowledgments

For further information, please contact Robin M. Nazzaro at (202) 512-3841 or nazzaror@gao.gov. Sherry L. McDonald, Assistant Director; Ellen W. Chu, Alyssa M. Hundrup, Mehrzad Nadji, and Barbara Timmerman made key contributions to this statement.

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